

REMARKS

Claims 1 – 6 and 9 – 25 are pending in the present Application. Claims 17 – 23 and 25 are withdrawn from consideration. No claims have been cancelled, leaving Claims 1 – 6 and 9 – 25 for consideration upon entry of the present Amendment.

Claims 1, 3-4, and 17 have been amended. Claim 1 has been amended to include the phrase “wherein the graphite and nanosized conductive filler and/or carbon fibers are homogeneously dispersed in the organic polymer”. Support for the amendment to Claim 1 can be found in the Specification as originally filed at least in Paragraphs [0097] and [0102]. Claims 3-4 and 17 have been amended to correct minor typographical errors and to provide the appropriate antecedent support. No new matter has been introduced by these amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1 – 6, 9 – 16, and 24 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,265,333 to Dzenis et al. (hereinafter “Dzenis”), in view of U.S. Patent No. 5,591,382 to Nahass et al., (hereinafter “Nahass”). (Office Action (OA) 03/28/08, page 2) Applicants respectfully traverse this rejection.

Claim 1 is directed to a conductive composition comprising an organic polymer; a nanosized conductive filler and/or carbon fibers; the carbon fibers having an average diameter of greater than or equal to about 1000 nanometers; and graphite in an amount of about 40 to about 90 wt% based on the total weight of the composition, wherein the graphite has average particle sizes of about 3 to about 5,000 micrometers, wherein the graphite and nanosized conductive filler and/or carbon fibers are homogeneously dispersed in the organic polymer.

In making the rejection the Examiner stated that it would have been obvious to formulate a conductive polymeric composition including carbon fibers as the secondary reinforcing fibers having a diameter less than 4000 nanometer and at least 3 nanometers, having graphite as the primary reinforcing fiber wherein the ratio of primary reinforcement fiber diameter to secondary reinforcement fiber diameter is about 100:1 or greater. (OA 03/28/08, page 5)

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art

relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

The composite of Dzenis is significantly different from the composition of the present claims. Dzenis is generally directed to fiber-reinforced composite materials that are susceptible to delamination along interlaminar planes. (Col. 1, ll. 555-57) Specifically, the reference discloses a fiber reinforced composite material comprising a resin matrix and primary reinforcement fibers. (Abstract) In order to prevent delamination in the fiber-reinforced composite, Dzenis discloses the use of secondary smaller diameter, reinforcement fibers at one or more ply interfaces, or portion thereof. (Abstract) The reference further discloses that the secondary, small diameter fibers may be in the form of a mat, fabric, and so forth, or that they may be that they may be distributed over the surface of the prepreg by spraying a gas or solution, or they may be spun directly on the surface. (Col. 10, ll. 20-32)

While Dzenis discloses that the secondary reinforcing filler e.g. carbon fibers, can be impregnated in the layer having the primary reinforcing filler e.g. graphite (col. 10, ll. 2-5), the reference does not teach or even suggest that the secondary filler can be homogeneously dispersed in the resin layer along with the primary filler. Thus, Dzenis does not teach or suggest all elements of the present claims.

Further, Dzenis clearly discloses that the purpose of using a layer of small, reinforcing secondary fibers is to reduce or eliminate the resin-rich zones near the primary ply surfaces. (Col. 3, ll. 62-66) Applicants thus contend that one of skill in the art, upon reading Dzenis, would not seek to modify the reference in order to arrive at the present claims as Dzenis teaches away from the present claims. In short, by disclosing that the secondary fillers are a separate layer used to prevent the delamination of two ply-layers, Dzenis specifically teaches away from homogeneously dispersing the secondary filler with the resin and the primary filler in a single composition.

Meanwhile, Applicants have discovered that the addition of carbon fibers or carbon nanotubes to compositions having high levels of graphite filler, are able to render the composition electrically conductive. The useful conductivity conveyed by the carbon fibers/nanotubes can be obtained at total graphite filler loading of greater than or equal to 55 wt%. Further, Applicants have also surprisingly found that good processability, i.e. injection molding, can be performed with this specific mixture, despite the high loading of both non-conductive and conductive fillers. This is a feature not afforded by other compositions having similar weight fractions of other types of electrically conductive fillers. The ability to injection mold these composition advantageously permits the manufacture of parts that have complex shapes, and for which a smooth finish is desired.

Therefore, as discussed previously, Dzenis does not disclose a conductive composition comprising an organic polymer, graphite, and a nanosized conductive filler and/or carbon fibers wherein the graphite, and a nanosized conductive filler and/or carbon fibers are homogeneously dispersed in the organic polymer. In addition, Dzenis teaches away from the present claims. Thus, for at least these reasons, Dzenis does not disclose or suggest all elements of the present claims.

The Office action relies on Nahass to disclose carbon fibrils derived from polyacrylonitrile or pitch. In making the rejection, the Examiner stated that it is common to form carbon fibers from polyacrylonitrile or pitch, and that nothing unobvious is seen in using fibers derived from these components. (OA 03/28/08, page 5)

Nahass is directed to polymeric compositions having improved toughness and conductivity, comprising carbon fibrils. (Abstract) Nahass also discloses mixing the carbon fibrils with the polymeric material in order to distribute the fibrils and applying shear to break down the carbon fibril aggregates. (Abstract) Further, Nahass discloses that a masterbatch is made by adding 1-60 weight percent of carbon fibrils to one or more selected polymers. (Col. 6, ll. 63-65) However, while Nahass discloses carbon fibrils blended with one or more polymers, it does not disclose a conductive composition wherein graphite and a nanosized conductive filler and/or carbon fibrils are homogeneously dispersed in an organic polymer.

To achieve the Applicant's claims, the artisan would have had to be motivated or prompted by the disclosure of the references to modify the layers of Dzenis to prepare a conductive composition comprising an organic polymer, graphite, and a nanosized conductive

filler and/or carbon fibers wherein the graphite, and a nanosized conductive filler and/or carbon fibers are homogeneously dispersed in the organic polymer. In addition, the references must also provide support that the resulting article would function as intended. However, neither Dzenis nor Nahass provide the motivation or prompting to modify the layers of Dzenis.

Further, Applicants contend that by dispersing the organic resin and primary filler of Dzenis, with the carbon fibers of Nahass, that the invention of Dzenis would no longer function as intended. As discussed previously, Dzenis clearly discloses that the purpose of having an interface layer of secondary filler is to ensure that the resin-rich zones found at the ply interface are minimal. However, the dispersion of the secondary filler with both the resin and the primary filler, would effectively eliminate the interface layer. Consequently, there would no longer be a barrier between the ply layers capable of reducing these resin-rich zones that normally contribute to the delamination of the ply-layers. Thus, by combining the components as suggested by the Examiner, the invention of Dzenis would be rendered ineffective for the purpose in which it was intended.

In this regard, the courts have held that “[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The courts have also held that ‘[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.’” *In re Ratti* 270 F. 2d 810, 123 USPQ 349 (CCPA 1959).

Finally, Applicants respectfully submit that there is no teaching or suggestion in either Dzenis or Nahass, when read as a whole, to motivate an artisan to depart from the process of Dzenis and have any expectation of success to do what Applicants have done. That is, the dispersion of the graphite and the nanosized conductive filler and/or carbon fibers in an organic polymer produces unexpected results.

As is shown in Table 2, the addition of carbon fibers or carbon nanotubes to highly filled graphite composition, substantially increases the level of conductivity observed. For Example, a comparison of Sample 1 with Sample 4, shows that in a polycarbonate composition, replacement of up to 4 wt% of graphite with ketjen black increases the conductivity of the sample by approximately four-fold. An even more dramatic increase in conductivity is observed in

polyamide compositions. For Example, a comparison of Sample 7 with Sample 9, shows that by replacing 4.6 wt% of graphite with ketjen black, the conductivity increases more than 19 fold, and a comparison of Sample 10 with Sample 15, shows that replacing graphite with 4 wt% carbon fiber increases the conductivity by at least 10 fold. In addition, the results provided in Figure 2, also show that in highly filled graphite conductive compositions, the use of a small amount of carbon increases the conductivity substantially. Significantly, the compositions are also injection moldable. As such, it may be generally seen that a higher proportion of graphite may be used at higher filler loadings, while still maintaining the injection moldability of the compositions. These results are unexpected.

In this regard, the courts have held that “[A]n applicant can rebut a *prima facie* case of obviousness by presenting comparative test data showing that the claimed invention possesses unexpectedly improved properties or properties that the prior art does not have.” *In re Dillon*, 919 F.2d 688, 692-93, 16 U.S.P.Q.2d 1987, 1901 (Fed. Cir. 1990).

For at least these reasons, the Applicants believe that the Examiner has not made a *prima facie* case of obviousness over Dzenis in view of Nahass. Applicants respectfully request a withdrawal of the obviousness rejection and an allowance of the claims.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the objection(s) and rejection(s) and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 50-1131.

Respectfully submitted,

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